APRIL/MAY 2025

23PPH23 — ELECTROMAGNETIC THEORY

Time : Three hours Maximum : 75 marks

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SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is meant by multiple expansion?

2. Outline the role of boundary conditions in electrostatics.

3. Recall the concept of magnetic moment.

4. State Biot-Savart law.

5. What is meant by gauge invariance?

6. State Faraday's law of induction.

7. Tell the concept of circular polarization.

8. What is the role of waveguides in electromagnetic wave propagation?

9. Give the significance of magneto-hydrodynamics wave.

10. What is meant by plasma?

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Examine the presence of a dielectrics in electrostatic energy.

Or

(b) Enumerate the significance of the displacement vector in electrostatics.

12. (a) Obtain the expression for magnetic vector potential.

Or

(b) Distinguish the significance of magnetic induction in macroscopic media.

13. (a) Distinguish between Coloumb and Lorenz gauge.

Or

(b) Analyze the significance of conservation laws in electromagnetic fields.

14. (a) Discuss the propogation of plane wave in non-conduction media.

Or

(b) Select the significance of the inhomogeneous wave equation in wave propagation.

15. (a) Write a short note on Alfven waves.

Or

(b) Obtain the simplified magneto hydro dynamic equation.

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SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Obtain the Laplace equation in three dimension.

17. Evaluate the significance of boundary conditions in solving magnetostatic problems.

18. State and prove Poynting's thorem.

19. Discuss the propogation of waves in a rectengular wave guide.

20. How plasma can be confined in a magnetic field.

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